

Bat and Other Intervention Modeling Projects, Flip Chart Notes (transcribed from written input from all country teams)
Brussels PREDICT All-Country Meeting, 11 January 2018

Wildlife Value Chains

Medium and Large Value Chains

1. Upstream vs. local viral diversity

- Indonesia: Linked market - fields sites
 - markets: Kawangkoan, (?) Tohnohon, Langoway (all in N. Sulawesi)
 - fields: Gorontalo, SE Sulawesi, W. Sulawesi, + N. Sulawesi (Imung)
- Bangladesh
 - Migratory wild birds/water fowl
 - hunting -> Market value Chain (Arif)
- CIV = markets (all markets in Abidjan)
- ROC: specific market in Brazzaville called Total Market (Anne)
- Market network data? (where are markets?)
- Cameroon (specific market in urban areas)

2. Assessing viral sharing with market species

- Laos: Previous data available, not currently working in live market, but know locations/species
- Viet Nam: Rate trade route: P1 data, P2 samples
 - (Nga) + WL farms: miz species (P1 data, P2 samples)
- Indonesia (Imung): Rodent + Bats: P1 data, P2 samples
- DRC: highly feasible, fresh meat markets (6 Kinshasha markets)
- Cameroon: 3 rural markets
- ROC: 3-4 urban markets in Brazzaville

3. Concerning live market to non-live

- P1 data (Greatorex et al.) to examine non-live market viral diversity/prevalence vs. other live markets in SEA
 - live and non-live species in markets in CWR (?) and DRC (Jim)
 - ongoing in Indonesia (N. Sulawesi markets) (Imung)

4. Reduce Market Biodiversity

5. Will policies for market-based interventions be accepted?

- China: Market closure during AI seasons (policy existed). Data may be available
 - If they are burdensome on vendors, like stiffer penalties, acceptance would be difficult in Cameroon + DRC
 - However, this week we've been discussing the idea of lower pricing for permits for selling bushmeat, perhaps associated w/ participating in educational intervention
 - Ghana - assess sales... recent Ebola outbreak in WA -> will public education affect handling and recognition of risk? William Ghana
 - Laos PDR already made wildlife sales illegal in markets - look at effectiveness? (Sarah)
 - Liberia: It would be good to pilot/survey market works before implementing policy

- Tanzania - The intervention will be accepted and has minimal impact to their selling products
- CIV and ROC: Intendit (?) - NOT ALLOWED to eat bushmeat, only if ebola ban on meat. Doesn't work without ebola threat

Bat Hunting

Bat Hunting and Hunted Meat Value Chain

6. Hunter Behavioral Risk Hotspots

- Liberia: Lota County need survey on hunting - it does exist
- Nepal: PREDICT Nepal working in a rural community that hunt/bush meat bats. We have been collecting bat samples and risk/behavior data in these sites for the past 2 years
 - Sierra Leon: bat hunting in Koinadugu district. Team has sampling sites
 - Cambodia: hunting active, under ground
 - Biological sampling of hunters community -> spillover risk (*can't make out*)
 - Cameroon:hunting practices are there but not in the PREDICT sites. 2 regions North west region and far North region

7. Bat Hunting Seasonality

- Liberia: need more data to understand seasonality
- Nepal PREDICT has been collecting bat seasonal data on a community (high risk) for the past 2 years
 - yes, believed to be seasonal (*no country listed*)
 - winter season hunting (Nov - Feb) NW of porf County (?)
 - Cambodia: More Active after junen in appear (Kandal) [*can't make out*]

Ecotourism/Recreational/Religious exposure to bat caves

8. Bat Cave biodiversity risk

- Myanmar: Growing data
- Cambodia: data/virus
- Thailand
- Egypt: Bat caves are far from population
Some of them in ancient temple
- Senegal: Bat Caves, Bat sanctuaries
- China: Bat caves map available
Human disturbance to caves evaluated
- Rwanda: Interested, Julius Nziza
Cave roosts biodiversity risk assessment in volcanic caves
- Kenya: caves + bats ecotoursim
- Cameroon: bat caves in many areas

9. Bat Tourist Interaction

- CIV: no caves
- Myanmar: Some pay to , locally managed (Management committee)
- Thailand: had lepto in tourists that visited
- Nepal: Ecotourism/ tourism in Bat caves, exposure to guano while tourist visits these caves. Nepal would be interested

- Jordan: kids going to caves. Tourist in on place. Come to historical caves
- Egypt: Tourism in pyramids/tombs
- Indonesia (Bali) - Cave - prayer/ religious tourism
- Rwanda - interested, Julius Nziza. Ecotourism in volcanic caves
- Cameroon: caves, tourism, and religious
- Senegal -> Interaction Caves-Tourists
- Laos: Lowangenmtha Province, ecotoursim in caves with roosting bats, near border
- China: Guanyxi ecotourism caves. Recreational places for locals
- Cambodia (Kampot): Tour/Guano/Kids/Tour guides). Temple in SiemReap, data available
- Uganda: Bat caves tourism
- Kenya: Mountain Cave tourism
- Tanzania: Tourist Caves - tour of bats (Ambori caves) Tonga -> Renzamia
- DRC : Ecotourism not common...risk of tourist exposure to bats very limited
- Malaysia: One of the DEEP FOREST sites - Gontantong Cave
- CIV: plateau neighborhood in Abidsan (+/- 20000 bats!). No idea of interaction, but +++++ tourists

10. China-specific project, no notes from all-country input

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Bat Community Interactions (Including livestock)

12. Regional risk of bat-pig outbreak

- Tanzania: Migratory bats, bat ... mango farms
- DRC: interaction between people and bats is very common (hunting, living in homes)
- Myanmar: Flying fox (1000+ colony) over small pig farm (10 + pigs). Free roaming pigs in village around guano warehouse and cave site.
- Senegal
 - Community interaction (human-livestock)
 - Border with Bissau Guinea and Gambia
- Uganda: Huge bat colonies in towns, schools, etc.
- Bangladesh: bat livestock interaction, half eaten fruits, sap drinking
- Jordan: kids going and catching bats in caves
- Ghana: military hospital (Predict Site)
 - Major bat colony
 - bat - staff/patient/visitors interactions
 - bat hunting
 - bat tourists
 - bat fly paths on Accra city
 - bats and parked vehicles, supplies, e.t.c
- Kenya: community dispensaries and recreation facilities
- Malaysia
 - Peninsular concurrent sites (indigenous communities) with their pets/livestock situated in the forests

- Vietnam
 - Bat hunting and consumption
 - Bat feces collection
- Cameroon: People and livestock (?) in some caves and houses with bats
- India:
 - bats in human dwellings
 - in orchards
 - human and livestock may share food
 - bat hunting but not sold in markets but for home consumption
- Uganda
 - Bats in human dwellings e.g. fruit bat colonies in big towns, schools, hospital compounds, and insectivorous bats in roofs of houses
- CIV: Bingerville +++pigs. need to look at bat interaction

Bat Guano Farming/ Harvesting

13. Bat harvester intervention
 - Myanmar: data available
 - Cambodia: (Veasna Duong) data available
 - Thailand: Behavioral changes
14. Bat guano farming and viral survival
 - Cambodia (Vibol): always collect in afternoon (dry)
interested
 - Viet Nam: P1 data, P2 samples
 - Rwanda: Interested (Julius Nziza)
 - Guano harvesting going on in one site, been collecting data
 - Thailand: viral diversity + seasonality
 - Myanmar: data for guano farming. interested for virus survival
 - CIV: interested, no data
 - ROC: interested, no data
 - IndonesiaL interested, W. Sulawesi (Imung)
 - Cameroon: interested
 - DRC: interested
 - [REDACTED] interested

Shared Food Resources

15. Fruit bat-livestock-orchard overlap
 - Bangladesh
 - India
 - Senegal
 - Cameroon
 - Nepal: Observations, Govt Livestock data (spatial)
 - Malaysia (PM + S)
 - OA communities w fruit + domestic animals
 - cattle in oil palm
 - dvs + UPM have data

- MOA has orchard data

Cambodia

- (Vibol) fruit and orchard palm juice collection / dry season
(telemetry)

Tanzania

fruit bats - mango, cashew

GPS bat roost data

orchards (ground truthed) + observation

Myanmar - Interested

Sierra Leone

CIV and ROC interested to study, no data

Jordan: Fruit bats fly to get their fruit from trees (different fruit trees)

China: Bat eating fruits and interact with domestic animals.

Government policy lacking

Thailand

Fruit bats distribution data

Ghana

Bat-wildlife food sharing with humans at PREDICT site - Boaberg-
Fiemusik

16. Bat- palm sap overlap

India

Bangladesh

Senegal

Myanmar - interested